

DOCUMENT RESUME

ED 300 527

CE 050 774

AUTHOR Dorofeeva, N.; And Others
TITLE Content of General Education in Programmes of Agricultural Technical and Vocational Institutions. Ukrainian SSR. Studies in Technical and Vocational Education 26.
INSTITUTION United Nations Educational, Scientific, and Cultural Organization, Paris (France).
REPORT NO ED-87/WS/31
PUB DATE 87
NOTE 54p.; For related documents, see CE 050 776-777.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Agricultural Education; Case Studies; Curriculum; Ecology; Educational Change; Educational History; Educational Legislation; Educational Policy; Enrollment; Financial Support; Foreign Countries; Instructional Materials; Interdisciplinary Approach; Postsecondary Education; Program Administration; *Program Content; *Program Development; *Program Implementation; Secondary Education; Teaching Methods; *Technical Education; *Vocational Education
IDENTIFIERS *USSR (Ukraine)

ABSTRACT

Perhaps the main objective of vocational-technical education in the Ukrainian Soviet Socialist Republic today is to train middle-level managers and agricultural workers to take part in the republic's comprehensive program to accelerate its social and economic development. Secondary agricultural institutions called sovkhov-technicums have played an important role in upgrading the quality of training provided to specialists in agriculture. Students being trained as agricultural specialists are also given training in general subjects and especially in biology. Ecological education and an interdisciplinary approach are also at the center of the movement to improve vocational-technical education. Active teaching methods, including problem solving, brainstorming, computer-assisted instruction, olympiads, and group and individual tutorials, coupled with increased use of audiovisual teaching aids, are being encouraged. Since 1987, teachers of general subjects at technical schools have had to improve their professional skills at regional advanced teacher training institutes. Efforts are under way to create a unified system of general secondary education throughout the republic and establish a closer relationship between general secondary and vocational education. (MN)

* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *

26

STUDIES IN TECHNICAL AND VOCATIONAL EDUCATION

ED300527

Ukrainian
SSR

Content of General Education in Programmes of Agricultural Technical and Vocational Institutions

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)

☒ This document has been reproduced as
received from the person or organization
originating it.

☐ Minor changes have been made to improve
reproduction quality.

• Points of view or opinions stated in this docu-
ment do not necessarily represent official
OERI position or policy.

"PERMISSION TO REPRODUCE THIS
MATERIAL IN MICROFICHE ONLY
HAS BEEN GRANTED BY

S. Adkins

TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC)."

1987

UNESCO

STUDIES IN TECHNICAL AND VOCATIONAL EDUCATION

1. Developments in Commercial Education (1983, English, Arabic).
2. The Organisation of Productive Work in Technical and Vocational Education in the United Kingdom (1983, English).
3. The Organisation of Productive Work in Secondary Technical and Vocational Education in the People's Republic of Bulgaria (1983, English).
4. Policy, Planning and Administration of Technical and Vocational Education in Ghana (1983, English).
5. Politique, Planification et Administration de l'Enseignement Technique et Professionnel en Turquie (1983, French).
6. Politique, Planification et Administration de l'Enseignement Technique et Professionnel en Algérie (1983, French).
7. Policy, Planning and Administration of Technical and Vocational Education in the Netherlands (1983, English).
8. Policy, Planning and Administration of Technical and Vocational Education in India (1983, English).
9. Computers in Technical Teacher Education in the United Kingdom (1984, English, Arabic).
10. Computer Sciences in Vocational Teacher Education in Denmark (1984, English).
11. The Organisation of Educational and Vocational Guidance Services (1985, English).
12. Policy, Planning and Management of Technical and Vocational Education in the Hashemite Kingdom of Jordan (1985, Arabic).

(cont'd. on back cover)

CONTENT OF GENERAL EDUCATION IN PROGRAMMES
OF AGRICULTURAL TECHNICAL AND VOCATIONAL INSTITUTIONS

Prepared for UNESCO by
N. DOROFEEVA,
Ye. DUBINCHUK,
V. IVASHKOVSKY,
Y. TUMANSKAYA

Kiev, 1987

ED.87/WS/31

Published in 1987 by the United Nations
Educational, Scientific and Cultural Organization
7, place de Fontenoy, 75700 PARIS
Printed by Unesco

© Unesco 1987
Printed in France

PREFACE

The present document is the twenty sixth in the series "Studies in Technical and Vocational Education". These studies are based on a Unesco policy instrument, the Revised Recommendation concerning Technical and Vocational Education, which was adopted by the General Conference at its eighteenth session in November 1974. Furthermore, they are in conformity with Approved Programmes 20 C/5, 21 C/5, 22 C/5 and 23 C/5, which indicated that a number of guides, studies and publications in the field of technical and vocational education would be reproduced. The studies are intended to assist policy-makers, planners, administrators and experts in technical and vocational education. They reflect Unesco's concern with fostering an effective exchange of experiences and ideas in this field as well as Member States' efforts in promoting the implementation of the Revised Recommendation.

The studies, which were prepared under contract for Unesco, should be considered as information documents that require continual revision and updating. A list of the studies appears on the inside of the front cover of this document.

We wish to express our appreciation to all those who participated in preparing this study and hope that it will provide its readers with information useful to them in the promotion and development of technical and vocational education.

The views expressed in this study are those of the individual(s) concerned with its preparation and do not necessarily reflect those of Unesco. The designations employed and the presentation of the material do not imply the expression of any opinion whatsoever on the part of the Unesco Secretariat concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

CONTENTS

	Page
INTRODUCTION	5
1. EDUCATION AND TRAINING OF TECHNICIANS FOR AGRICULTURE IN THE UKRAINIAN SSR	5
1.1. General information	5
2. TERMS FOR ENTERING SPECIALIZED SECONDARY INSTITUTIONS	8
3. SUBJECTS OF GENERAL EDUCATION	10
4. ECOLOGICAL EDUCATION AND INTERDISCIPLINARY APPROACH	12
5. TEACHING METHODS AND MATERIALS	15
5.1. Methodological work	15
5.2. Teaching methods	22
5.3. Teaching aids	28
6. TEACHING STAFF	32
7. SECONDARY AGRICULTURAL VOCATIONAL EDUCATION IN THE UKRAINIAN SSR	33
8. CONTENT OF GENERAL SUBJECTS	36
9. INTERDISCIPLINARY APPROACH AND VOCATIONAL TRENDS IN TEACHING GENERAL EDUCATION SUBJECTS	39

10.	ECOLOGICAL EDUCATION	42
11.	TEACHING METHODS AND AIDS	44
12.	TRAINING FACILITIES AND METHODOLOGICAL PROVISIONS FOR TEACHING GENERAL SUBJECTS. TEACHING STAFF	47
13.	CONCLUSION	48

INTRODUCTION

The course for acceleration of social and economic development of the Ukrainian SSR, for establishment of the system of continuous education, stemming from the decisions of the 27th Congress of the CPSU, provides for cardinal changes in the sphere of specialized technical and vocational education. The established system of training provides the branches of the agro-industrial complex with qualified technicians, middle level managers and skilled workers.

Certain forms and methods of theoretical and practical training, qualification upgrading, and a variety of educational work have been set up. Workers and specialists of today should not only be highly skilled but highly competent and intelligent.

Now that primary attention is paid to the encouragement of the students' reflective activity, it is very important to organize the training and educational process in a new manner so that everybody - from worker to qualified specialist - can make the best use of sophisticated machinery and equipment, thus considerably promoting labour efficiency. It is therefore important to develop in students the knack of learning, to train would-be specialists and workers for independent cognitive work, to instill and develop in them efficient techniques of mental activity.

The basis of all this is the intensification of the training and educational process, teaching and learning of general education subjects on a qualitatively new level.

This work discloses in a condensed form the educational system that has been shaped in Ukrainian educational institutions of this type under present conditions.

1. EDUCATION AND TRAINING OF TECHNICIANS FOR AGRICULTURE IN THE UKRAINIAN SSR

1.1. General information

In the Ukrainian SSR, training of technicians and middle level managers for agriculture is provided in 52 specialities (full-time departments) at 122 educational establishments, among them 36 "sovkhoz-technicums" and 86 agricultural colleges; and in 37 specialities (correspondence departments) at 105 educational establishments.

The specialities are approved by the USSR Ministry of Higher and Specialized Secondary Education by agreement of the State Planning Committee of the USSR.

Specialized secondary education is provided free of charge on the principle of equal rights to education for all citizens of the USSR irrespective of race, nationality, sex, property and social status, on the basis of the wide-scale development of culture of Soviet peoples, national in form and socialist in content. At most educational institutions training of students is provided in their native language.

The students of specialized secondary schools are trained to work as specialists and managers of subdivisions in collective and State farms, agro-industrial and other agricultural enterprises of the Republic. That is why when organizing the training and educational process, account is taken not only of regularities specific to a particular educational institution but also the principles of agricultural enterprises' performance and new methods of production introduced at these enterprises.

The main goal in the work of educational institutions is to improve the quality of training taking into account the reorganization of the economic structure taking place in the country and the Republic, efficient forms of management, organization and encouragement of labour. Much importance is attached to the closest possible integration of training with production and science, to the transition to their new principles of interaction.

The main tasks of secondary agricultural schools are :

- training of specialists combining professional competence with ideological and political maturity, education in the spirit of patriotism and internationalism ;
- a specialist should receive proper professional training, possess up-to-date economic thinking, skills in managerial and organizational work, be fairly competent in the use of computers as applied to his profession, be a highly cultured man, have command of a foreign language ;
- cultivate in a specialist initiative and responsibility, a need for constant innovation and improvement of his knowledge, an ability for making bold decisions and implementing them ;
- provide physical training and arrange for health strengthening of students.

Scientific organization of the training and educational process at institutions of this type is regarded as a continuous and systematic improvement of this process on the basis of scientific advancements, advanced teaching and production experience, upgrading the quality of teaching and education of specialists. Under conditions of highly developed agricultural production, specialists would be highly competent, be aware of the political goals of the Party and their country, be a patriot of their homeland, educated in the spirit of communist attitude to labour, have high moral qualities, possess skills in organizational, political and social work.

Specialists should have deep and sound knowledge, theoretical and professional alike, practical skills in their profession, work constantly to raise their cultural and professional standard, cultivate diligence, be irreconcilable to drawbacks, treat the task assigned with all responsibility, take initiative and be creative in work. This is an objective set for training specialists who are going to work in the State Agro-industrial Complex.

Organization of "sovkhoz-technicums" has played an important role in upgrading the quality of specialists in agriculture. This secondary agricultural institution is intended to provide specialized secondary education according to the full-time or part-time (correspondence) curricula.

Normally, a "sovkhoz-technicum" is set up on the basis of a large and advanced State farm and appropriate agricultural college. The best combination of specialities in the "sovkhoz-technicum" are "Agronomy", "Zootechnics", "Agricultural mechanization" and others.

Educational institutions of this kind make it possible to offer the best combination of theoretical and practical training of would-be specialists. Apart from permanent teaching staff, qualified specialists of the State farm are involved in training on a part-time basis.

The "sovkhoz-technicums" function on a self-supporting financial basis. Their expenditure for students' training is financed from the State budget. Profits obtained from their work are used in accordance with the laws in force. The "sovkhoz-technicum" has its own funds for increasing its material base, incentives, socio-cultural work, housing and also a reserve fund. The socio-cultural and housing fund, besides being used for its direct purpose, envisaged by the Regulations, may also be used for improvement of training and educational work and equipping laboratories and study rooms.

"Sovkhoz-technicums" of the Ukraine have at their disposal sufficient material resources to provide theoretical and practical training of highly skilled personnel for agriculture of the Republic. All of them are arranged at standard training complexes consisting of educational and laboratory premises, training workshops, veterinary clinics (if there are appropriate specialities), hostels, dining rooms, gymnasias and stadia.

The adequate training and material facilities, high level of agricultural production in the "sovkhoz-technicums" make it possible to render the educational and training process scientifically organized in nature.

The **agricultural colleges**, along with the "sovkhoz-technicums", train middle level specialists for agriculture. These colleges are rather smaller educational establishments which provide training in one to three specialities. Their material and technical facilities are similar to those of "sovkhoz-technicums". The training farms of agricultural colleges are also rather small - from 250 to 450 hectares of

land ; their primary production elements are brigades and farms the production activities of which are run on a self-supporting basis making wide use of collective contracts. The educational and training expenditure of colleges is financed from the State budget.

The training terms (from two to four years) in each speciality are determined by the curricula depending on the education received at school (on the eight- or nine-year basis) and a stock of knowledge required for a particular speciality.

Each specialized secondary establishment has its own regulations drawn up on the basis of the Regulations on specialized secondary institutions and Regulations on "sovkhoz-technicums" approved by the State Agro-industrial Committee of the Ukrainian SSR.

The curricula are subject to periodical revision (every five years), they are invigorated after approval by the USSR Ministry of Higher and Specialized Secondary Education or, on behalf thereof, by the State Agro-industrial Committee of the USSR.

The main forms of training are : lessons, lectures, seminars, laboratory work, yearly and diploma projects, practical training, graduation practical training, tutorials, self-training, written tests.

The progress and conduct of students are assessed according to a five-point system : "5", "4", "3", "2", "1". The highest mark is "5". Mark "3" means satisfactory, i.e. that the student has reached the minimum standard required in a particular course of study.

The academic year normally starts on 1 September and consists of two semesters. According to the curriculum, twice a year students have their vacation - in winter and in summer - from eight to ten weeks long.

Apart from practical training, the academic hour is set at 45 minutes for all forms of training. Student groups usually number from 25 to 30. When making laboratory studies or in other forms of training, groups may be divided into two sub-groups, each numbering from 12 to 15 students.

The curricula envisage compulsory and optional subjects for each speciality. Fixed time-tables are drawn up for each semester.

2. TERMS FOR ENTERING SPECIALIZED SECONDARY INSTITUTIONS

The training of specialists at agricultural colleges and "sovkhoz-technicums" is effected on the basis of lower secondary or completed general secondary education ; the day departments admit those who have finished vocational schools and who have a record of practical work after school of not less than two years. Such a record is not necessary for persons who finished vocational school with distinction, neither is

it required for those who are recommended for study by teaching staff of vocational schools nor for those applying to correspondence departments.

Every year, the USSR Ministry of Higher and Specialized Secondary Education approves the Rules of admittance to specialized secondary educational establishments of the USSR stipulating the admittance procedure with the indication of educational qualification required.

The agricultural colleges preparing managerial personnel for State and collective farms, as well as special departments for training managerial personnel for agriculture admit deputy heads of collective farms, managers of State farm divisions, farm and section managers, team leaders and their assistants, superiors of mechanized groups having experience in their jobs of not less than one year, as well as skilled State farm workers and collective farmers having completed secondary education and working experience for two years as machine-operators, cattle-breeders and plant-growers.

When applying to educational institutions, school-leaving certificates are to be produced in the original.

Certificates of secondary vocational school are valid for entering agricultural colleges only if they contain evidence that their holders have undergone a general educational course in conformity with eight-year or general secondary school programmes.

Those applying to secondary agricultural educational institutions to carry out studies on the basis of eight-year school pass their exams in their native or Russian language (dictation) and mathematics (oral exam). The general secondary school leavers pass their examinations in the Russian or native language and literature (written composition) and mathematics (orally).

At the educational institutions where a non-Russian language is used for instruction, the applicants take their examination in the language that is used there for teaching.

At most technical colleges of the Republic teaching is performed in Ukrainian, but there are some subjects of general education that are taught in other languages (e.g. Hungarian, Moldavian). It is important for students to master their Ukrainian or Russian in order to have a chance in the future of entering a higher educational institution of the country or Republic. In this case, a unitary level of general education should be provided taking account of peculiarities of national educational establishments.

Russian was adopted by the Soviet people of their own free will as a means of communication among Soviet nations.

With a view to the further improvement of training, more complete manning of enterprises and organizations with specialists and reducing their migration, the USSR Ministry of Higher and Specialized Secondary Education recommends all similar ministries in the Union's Republics to

carry out target-oriented programmes of specialist training on a wider scale.

Every year target-oriented training plans are drawn up for agricultural enterprises which provide study grants and invite their advanced workers, employees, as well as local school leavers to make studies at specialized secondary institutions.

This year enrolment of students (without entrance examinations) was made at day and correspondence departments on the basis of eight-year and general secondary schools in the following specialities: agronomy, zootechnics, veterinary science, electrification of agriculture, hydro-amelioration, mechanization of hydro-amelioration, mechanization and electrification of cattle-breeding, poultry farming.

3. SUBJECTS OF GENERAL EDUCATION

The level of a specialist's professional training is determined, first of all, by the subjects studied, by the time spent on studying a particular subject, by the instructors, and the level of teaching and by the way in which the training process is organized. The most important documents determining quite a number of factors are the curriculum and syllabus.

Since 1 September 1983 at day departments, and 1985 at correspondence departments, new curricula have been introduced in the Republic for all specialities. These are intended for the further improvement of the standard of general education of specialists due to the introduction of new subjects, such as: "General biology", "World economic and social geography", "Soviet legislation", "Russian language" (optional).

The syllabus is the main document determining the content, system and scope of knowledge that students should acquire in a particular subject. The syllabus should reflect the interdependence of theory, practice, everyday life, up-to-date advances of science, and meet the requirements stemming from the decisions made by the Governments and Communist Parties of the Soviet Union and the Ukraine. The centralized core syllabuses can take account neither of regional peculiarities nor of current achievements in them. They are flexible and provide only general guidelines. That is why all responsibility for the actual content and quality of syllabuses is placed on the subject commissions composed of most experienced teachers and on the principals of educational institutions. Teachers continuously introduce necessary changes and amendments into the core syllabuses. The material which has become obsolete or which has lost its scientific value is excluded from syllabuses while issues stemming from the present-day level of scientific, technological and production development are included, from the development of educational research and socio-political changes in the country.

The curricula and syllabuses at specialized institutions based on eight-year school make provision for the study of such subjects and in such time interval so that graduates from agricultural colleges and general secondary school-leavers have an equal level of competence in general education subjects, thus offering an opportunity for both to continue their studies at institutions of higher education.

Table 1 presents subjects and hours needed for studying general subjects for particular specialities.

Table 1

Subject	Specialities								
	Agronomy			Zootechnics			Mechanization of agriculture		
	Total hours	Including		Total hours	Including		Total hours	Including	
		Class studies	*		Class studies	*		Class studies	*
General education cycle									
1. Literature	209	209	-	212	212	-	210	210	-
2. Mathematics	302	302	-	308	308	-	387	387	-
3. Physics	240	202	38	234	196	38	212	180	32
4. Chemistry	140	106	34	136	102	34	143	109	34
5. General Biology	60	50	10	60	50	10	72	62	10
6. Foreign language	100	100	-	102	102	-	100	100	-
7. Russian (optional)	99	99	-	103	103	-	105	105	-
TOTAL	1150			1155			1229		

* laboratory studies and practical work

Students, admitted on the basis of general secondary school, study the optional subject "Improvement of language learning" in their specialities for 90, 90 and 92 hours respectively.

As can be seen from Table 1, the general education cycles of subjects for the first two specialities are rather identical while for the third, an increase amounts to almost 80 hours mainly at the cost of mathematics and biology.

Such a number of subjects of general education and hours corresponds to those adopted at secondary and vocational schools of the Republic the students of which receive general secondary education.

A special cycle of subjects in these specialities is made up of : agronomy - 1,899, zootechnics - 1,988, mechanization of agriculture - 1,502 hours. If 621 hours, intended for studying general technical subjects, are added to the last speciality, the total will amount to 2,123 hours.

The percentage of general education subjects therefore accounts for "Agronomy" - 40, "Zootechnics" - 42 and "Mechanization of agriculture" - 42 (general technical subjects included) of the total number of hours.

As a result, a specialist who graduates from the agricultural secondary institution, irrespective of the speciality, receives adequate education to continue his studies at an institution of higher learning.

4. ECOLOGICAL EDUCATION AND INTERDISCIPLINARY APPROACH

Taking account of the fact that the graduates of agricultural secondary educational institutions should know the main tasks facing agriculture and microbiological industry, they should be competent in general biology.

When studying this subject, the students should know : features of life as a form of existence of matter ; the role of physical and chemical processes in living systems ; the fundamentals of biological systems ; the nature of metabolism, ontogenesis, heredity and mutation, the main theories - cell, chromosome heredity, evolution, anthropogenesis theories ; the main fields of application of one's biological competence in agricultural practice, industries, environmental control.

This course is based on the knowledge acquired by students during their studies of chemistry, physics, history, world economic and social geography, while the subject itself is a basis for a number of special disciplines. This subject is also very important for understanding the unity of all living things and the interdependence of all parts of the Earth's biosphere. The general biological regularities are a principle of rational nature management, environmental protection, intensification of agricultural production and care of human health.

The interdisciplinary logical links of this subject with other subjects and topics are of paramount importance.

For instance, a chapter in General Biology called "Origin and First Stages of Life Evolution on the Earth" is based on the competence of such a subject as non-organic chemistry (oxygen, hydrogen, carbon, nitrogen, sulphur, phosphorus and other elements of Mendel's law, their main properties). Not less important are organic chemistry : obtaining and chemical properties of saturated and unsaturated hydrocarbons ; physics - ionizing radiation, notions of the radiation dose, biological protection.

The chapter "Teaching on the Cell" is linked with non-organic chemistry : water, base, acids, solutions, matter structure, redox reactions ; with organic chemistry : chemical structure of organic compounds, carbohydrates, fats, proteins, nucleic acids ; with physics : properties of liquids, heat phenomena, first law of thermodynamics, optics.

The chapter "Fundamentals of Genetics and Selection" makes students knowledgeable when studying special subjects in the agronomic profession, in particular such subjects as "Selection and Seed-Growing", "Teaching of Heredity and Mutation" (fundamentals of genetics), "Fundamentals of Agricultural Plants' Selection", etc.

Recently, the work on problems in researching the interdisciplinary links and creative training of students has received a new impetus. Of particular interest in this field are studies in physics and electrical engineering. Physics not only plays an important part in forming a scientific view of the world but also serves as a theoretical basis for general technical subjects including electrical engineering. The students are felt to show a deeper interest in this field and understanding of physical phenomena taking place in Nature.

The course of electrical engineering (comprising fundamentals of electronics) covers the practical use of electromagnetic phenomena thus extending students' knowledge acquired during their studies of such sections of physics as "Fundamentals of Electrodynamics", "Optics", "Fundamentals of the Theory of Relativity", etc.

In this way the link between the general educational and special subjects helps students to shape an integral scientific vision of the world, to penetrate more deeply into the content of subjects studied, to adjust their study to their future jobs, and, finally, serves as a means for the development of individual qualities and personalities.

Middle level specialists, particularly agricultural, who are going to be engaged in environmental jobs, should know and strictly observe the laws of environmental control and rational use of natural resources.

Unremitting attention is paid to environmental protection in the Ukrainian SSR and in the Soviet Union as a whole. A number of legislative acts have been approved regulating land, water, forest, mountain

relations, guarding the laws of protection of free air and wild-life. The environmental laws show much concern for the health and well-being of Soviet citizens.

During studies at agricultural college, students should become imbued with the importance of ecological problems in order to safeguard the environment in their future work.

Taking into account the requirements of modern ecology, apart from ecological subjects envisaged in some syllabuses, teachers introduce and approve, in due order, changes and amendments to the programme of ecological education of students.

For example, in the subject "Plant protection" (Agronomy), such changes are introduced into most themes. When studying chemical, biological and agronomical methods of plant protection, students should become proficient in the ecological situation, develop in themselves skills and abilities for the protection of Nature.

Intensive crop growing technologies using high doses of fertilizers call for more stringent measures in pest control. Each zone of the Republic needs an optimum quota of pesticides and fertilizers. In this case pesticides are regarded as a component part of the integrated system of plant protection based on the combination of scientific, organizational and production methods. This will help to solve environmental problems in a more effective way.

Students become competent in plant growing and selection having learnt that proper selection of varieties and hybrids resistant to diseases and pests makes it possible to reduce the use of pesticides thus reducing environmental pollution.

When studying the course "Fundamentals of agriculture and cattle breeding", students concentrate their attention on the rational use of land. On the basis of knowledge acquired in the process of the study of biology, botany, chemistry, world economic and social geography, students are made to attach more importance to fresh water which is necessary to all living organisms.

The subjects "Weed control" and "Fertilizers and their use", bring to light the problems of water protection against pollution by herbicides and fertilizers. In the subject "Vegetable-growing technology" much attention is paid to the use of waste water from steam power plants and other electric power stations.

A number of ecological problems are discussed in the subject "Land reclamation", since being engaged in land reclamation, Man intervenes in Nature. Improper use of reclaimed land may be detrimental to natural processes such as increased water mineralization in rivers, decreased fresh water flow in water basins, etc. Much importance is attached to scientific substantiation of land reclamation in the Republic in the context of environmental control.

The global nature of ecological problems is revealed to would-be specialists. Nuclear weapons are most threatening for the existence of mankind and the biosphere, and hence mankind's every effort should be aimed at reducing weapons' production up to complete destruction. As a member of the United Nations, the Ukraine speaks in support of the positive solution of ecological problems for the peaceful development of mankind.

All this suggests that in training specialists, much attention should be paid to the interrelation between Society and Nature. Love of Nature is no longer sufficient. Much importance should be attached to cultivation of civic duty in students, their concern for environmental protection. Careful treatment of Nature should be based on students' understanding of its aesthetic, cognitive, economic and practical values.

So the students' care of the environment is formed on the basis of a combination of scientific treatment of nature, a conviction of the necessity for its protection and the personal concern of everybody.

5. TEACHING METHODS AND MATERIALS

5.1. Methodological work

In forming specialists for independent practical work under present conditions, in drawing them into the work of social utility, in their training as organizers of working teams along with organization of the training and educational process, much importance is attached to methodological work.

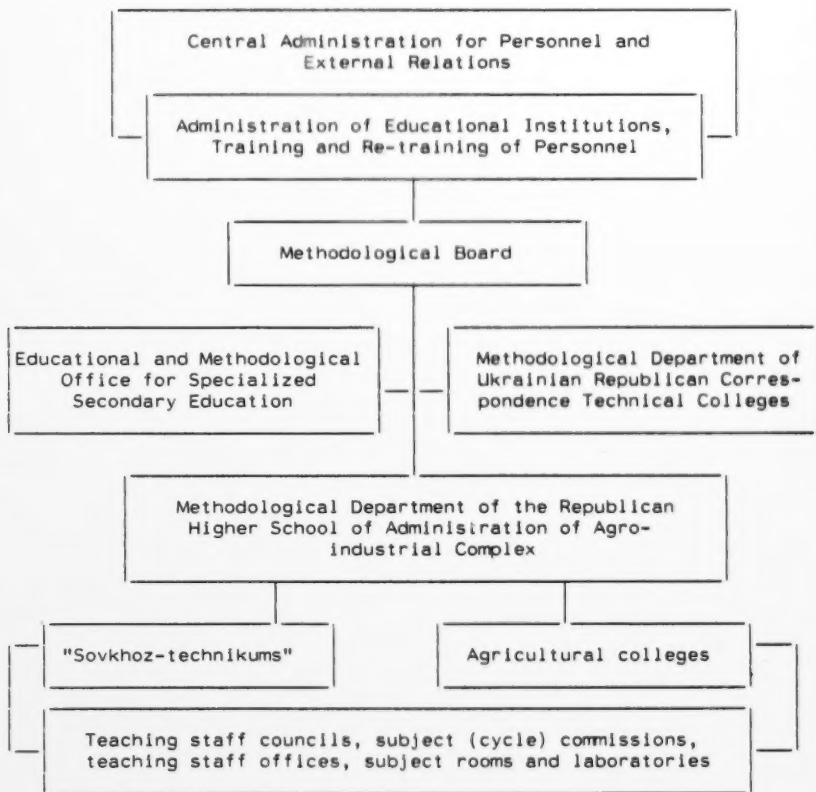
This work at present should be innovatory and creative in nature, it should provide a cardinal turn from the mass education for a new, individual approach, development of creative potentialities of future specialists on the basis of their independent work, active forms and methods of education.

The methodological guidance in the system of agricultural educational institutions of the Ukrainian SSR is continuously improved and accomplished according to the pattern shown in the diagram on the following page.

Methodological work with teachers of general education is coordinated and guided by the Scientific and Methodological Office for Specialized Secondary Education of the Ukrainian SSR Ministry of Higher and Specialized Secondary Education. Its methodological recommendations and guidelines provide a general trend in teaching general education subjects thus forming a common approach to teaching methods. Ministries and agencies of various industries and their educational and methodological boards, educational institutions follow the general trend and implement these recommendations adopting them to requirements of particular programmes and specialities.

D I A G R A M

of methodological guidance in the system of specialized
secondary educational institutions of the State
Agricultural Complex of the Ukrainian SSR



One of the most important things in this work is that the best results achieved by a particular teacher should become achievements of the teaching staff as a whole, while the achievements of the latter should become common to the system as a whole. Study, generalization and dissemination of advanced experience contribute to upgrading the quality of training and education.

The methods of **active training** have found wide use at educational institutions. These primarily involve combined methods of organization and control of the training and cognitive activities featuring a number of peculiarities as compared with traditional methods :

- forced activation of thinking (forced activity) when a student is compelled to be active whether he wants to or not ;
- engagement of students in the training process for a long time ;
- independent creative decisions made by the students, increased level of motivation and emotionality ;
- continuous co-operation between the teacher or teaching machines and students using feedforward and feedback.

Training methods are being continuously improved with due regard to the fact that along with increased scope, complexity and practical importance of competence and skills, the methods of cognition, of learning and using knowledge and skills should also be developed and become more complicated and, accordingly, training methods should undergo some changes.

Active training methods are used during non-simulation and simulation classes. Non-simulation classes are frequently concerned with the traditional forms of training such as lectures, laboratory work, practical studies, discussions, etc. Simulation classes usually have new forms of training - gameless and game studies. A characteristic feature of the latter is imitation of individual or collective activity.

The training process is divided into simulation gameless studies (analysis of specific situations at chemistry, physics and mathematics lessons, simulation exercises, individual simulator or working place) and simulation game studies (business games, discussion of a situation that may arise at some stage of analysis, game designing).

Experience has proved that this work is a success only if common requirements are imposed on students, if a package of organizational and methodological measures is planned and accomplished with the purpose of achieving such organization of the teaching staff's work which makes it possible to obtain the best results. The most efficient in this field are those teaching staff whose methodological work is not only planned but controlled.

All this is based on a complex of target-oriented and practical requirements for the personality with regard to the common and individual human factor.

In a well-organized teaching staff, there are always favourable conditions for creative research, personal initiative and, at the same time, an atmosphere of high responsibility for and exaction to all those engaged in the educational process.

The reshaping of the content of specialized secondary education creates prerequisites for wider and more purposeful use of open lessons. The aim of such lessons is to show in concrete examples the activating role of students' cognitive activities. Here the teachers attending these lessons gain experience that a great deal of material can be learnt in the shortest time and with good results.

The best open lessons proved to be those where a teacher, while talking to students, makes use of teaching aids, computers and such methods which help to use training time better. On the other hand, students are the active participants in the lesson and, as a result, receive sound knowledge and good skills.

After discussing each open lesson, the subject (cycle) commission adopts recommendations to bring the advantages of these lessons to the notice of every teacher of the cycle, while the administration of the institution recommends this experience to the whole teaching body. All this promotes creative plans for improvement of teachers' qualifications.

The problems of improvement of educational forms and methods are successfully solved by regional specialized secondary institutions of the Republic through combined methodological commissions of teachers of general educational and general technical subjects. With a view to studying and disseminating the experience of development and application of active training methods, these agricultural colleges hold seminars, scientific and practical conferences, pedagogical readings and so on.

As a result of persistent creative research on the part of the best teachers, most traditional forms and methods of teaching have been improved and modernized. Thanks to direct contacts and feedback, it has become possible to compare the active work of the teaching (teacher) and learning (student) parts; traditional forms and methods of training have started playing active roles.

Teachers of specialized secondary educational institutions of the Republic apply the following active teaching methods:

- lectures and seminars;
- reference synopses, reference diagrams and chronological tables;
- problem situations;
- "brain storm" method;
- technical training appliances and computers;
- graphological structures and punched cards;

- technical creative work (performance of individual tasks dealing with scientific and technical work) ;
- studies on the production sites, at museums, art galleries, exhibition halls, etc. ;
- creative "warming-up" on a subject ;
- short information, reports, conferences, student debates held during lessons and out of school ;
- technical, mathematical, digital and graphical dictation ;
- contest-lessons, auction-lessons, technical crosswords, charades, and other games ;
- control tests, olympiads, "Best in the Subject" and "Best in the Trade" competitions, competitive compositions, papers, reports ;
- programmed computer and computer-free check ;
- various kinds of independent work of students at lessons, reviewing of diploma papers ;
- group and individual tutorials.

To assist teachers, the Republican Scientific and Methodological Office of the Ukrainian SSR Ministry of Higher and Specialized Secondary Education, the Educational and Methodological Office of the Ukrainian SSR Agro-industrial Committee issued guidelines and recommendations on a number of subjects.

The Exhibition of Advanced Experience of specialized secondary educational institutions, which has been working under the auspices of the Educational and Methodological Office for 15 years, greatly contributed to the dissemination of advanced teaching experience.

The exhibition displays the present-day state of educational work at the institutions, their achievements in the improvement of the training process, methodological work, equipment of rooms and laboratories, in the development of scientific and technical creative work, contacts with production enterprises.

Every year the Exhibition's displays are improved and renewed to present new items developed by educational establishments. Its annual exhibition stock amounts to over 2,000 items. Since its opening, the Exhibition has been visited by more than 100,000 people, including teachers, students of departments of advanced pedagogical studies, delegates from the Union's Republics and foreign guests.

The Exhibition itself is one of the most efficient forms of study, generalizing and implementing the best achievements of educational science and practice of teaching.

The creation of "educational and methodological complexes", set up for each subject, greatly contributed to the advantageous use of active training methods.

What is meant by "educational and methodological complexes" for a specialized secondary educational institution ?

This is a reflection of a target-oriented approach to the improvement of the content and organization of the training process, its intensification, introduction of advanced methods, technical training appliances and computers, strengthening the links between the training process and science and practice of agricultural production. In other words, this is a reflection of the methodological work standard which has been reached and is being planned, and which links the training and educational process to all structural divisions of the educational institution.

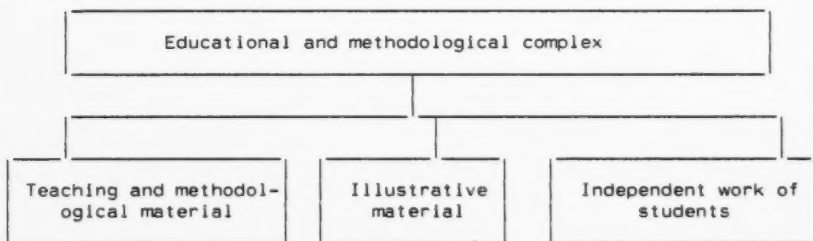
The primary aim of the "complexes" was continuously to promote the upgrading of the quality of teaching and the intensification of the training and educational process, to improve content, organization and methods of teaching, and, most important, to avoid duplication both in the content of documents and in the content of teaching and education of students.

This material is being developed in the following way. Teachers work out and systematize materials for their subjects in three sections: teaching and methodological material, illustrative material and tasks for students' independent work.

Section 1 - Teaching and methodological material

It contains materials required for organization of the teaching learning process (Table 2).

Table 2



- 1.1. Extract from the curriculum on the subject
- 1.2. Syllabus of the subject
- 1.3. Topical plan drawn up for the entire duration of the syllabus
- 1.4. Logic block-diagram of the subject (inter-subject and intra-subject connections)
- 1.5. Educational and methodological charts (plans) of studies worked out by each teacher for the entire duration of the syllabus

- 1.6. Lesson support card
- 1.7. Laboratory and practical work instructions
- 1.8. Tasks for tests
- 1.9. Examination papers (for the entire duration of the syllabus)
- 1.10 Didactic materials (methodological guides, recommendations, specific methods, etc.)

Section 2 - Illustrative material

This section summarizes all illustrative material available in the room or laboratory (Table 3).

Table 3

Illustrative materials

Nos	Topic titles	Films and film fragments	Film-strips	Slides	Albums and catalogs	Posters	Material to be distributed	Other visual aids
1	Introduction	N 1	-	-	-	N 1	-	-
2	Classification of metal-cutting machines	N 4	-	-	Catalog	N 6	-	-

Section 3 - Students' independent work

This section contains a list of all forms of work for studying a subject with the time of accomplishment being specified. Task specimens are arranged on individual planboards, stands (Table 4).

When working out "educational and methodological complexes" of subjects, all training and methodological and didactic matter is numbered according to consecutive enumeration adopted at the educational institution by speciality. For example, P-4 - mathematics, P-5 - physics, P-6 - general biology, etc.

All the material for each lesson is arranged in a separate file.

Table 4

Calendar schedule of work performed by students

Nos	Kind of work	Calendar time	Speciality (code)	Notes
1	Tests			
	N 1	3rd week of the semester	0501, 0504	
	N 2	5th week	0504	
	N 3	8th week	0501, 0504	
2	Reports on laboratory work			
	N 1	2nd week	0501, 0504	Laboratory
	N 2	4th week	0504	"
	N 3	5th week	0501, 0504	"
	N 4	6th week	0501, 0504	"
3	Practical work			
	N 1			Study room
	N 2			
4	Homework			Study room

5.2. Teaching methods

Using the elements of problem learning, the teachers apply the following method :

1. Before explaining new material, teachers put problematic questions to the students, set up problems situations which should be solved by the students at the end of the lesson after the new material has been explained.
2. Problem situations are included in homework.
3. It is common practice to put problematic questions related to the material presented in training films and visual aids which stirs up students' thinking ability and favours better understanding of material.
4. Problematic questions are also put proceeding from inter-subject connections. This method is useful for acquiring sound knowledge in

allied subjects and enables students to use the acquired knowledge when studying other subjects.

An efficient form of stimulating students' creative activity is properly organized independent work both at lessons and extramurally in combination with various kinds of control and use of didactic material.

At mathematics or chemistry lessons, students take mathematical or technical dictation and work with the book checking each other. Comparison of tables, diagrams and graphs is also an important form of independent work. In this case, students apply everything they know and all logically possible methods of generalization and specification of the material being studied. For instance, at a practical lesson in chemistry on "Unsaturated hydrocarbon", use is made of the models of ethane and ethyl, codegrams with tasks for independent work, codegram "Ethane molecular structure", tasks for programmed control of knowledge. When speaking about a new topic, the teacher substantiates its significance in general educational, economic, social and professional aspects. After the lesson, each student makes a report and answers a problematic question.

When carrying out independent work in mathematics lessons, teachers attach considerable importance to the development of algorithms, solving problems, proving theorems. The work is carried out by the whole group in order to assess students' capability of abstracting, generalizing, analyzing and, at the same time, synthesizing formal structures.

Of particular interest is organization of students' independent work at literature lessons when a variety of illustrative materials are distributed; illustrations for fiction, photographs of actors, manuscripts and autographs.

The use of these materials presupposes on the part of students consulting the text thoughtful re-reading of particular pages, concentrated work with the book and illustrations at the same time. To compare illustrations more easily, they are given together with a card. Cards are provided with texts containing reminiscences of actors' performance, and reminiscences of the actors themselves.

Such material, being documentarily authentic, awakens the students' interest, prompts them to reflection, helps them to define their attitude to what is being commented. Also used at lessons are visual aids made by teachers and students, helping to raise students' creative activity.

Independent work throughout the whole lesson is usually performed when a new topic is exposed, the topic itself is rather simple, students are prepared for such work, and material of the topic is not extensive.

For example, in physics, such a lesson may be given on the topic of "Spherical mirrors", since the material studied before on the topic "Lenses" has prepared students to understand the new one.

Such a lesson is conducted by a teacher by means of programmed training using a manual for studying new material, tasks for self-assessment and the usual physics textbook.

Students' independent work may be used by teachers in a partial way at any lesson and at any stage thereof. In this case an oral introduction, visual aids, training practical skills may be combined with students' independent work.

Guidance of independent work on the part of the teacher consists in the following :

- clear formulation of the task ;
- questions are written on the blackboard or distributed among students, to be answered when the work is over ;
- briefing of the students (attention should be paid to this point when studying the material) ;
- after independent work is over, questioning or discussion takes place to make assessments.

The questions asked by students are evidence not only of grasping and memorizing the material but of understanding the knowledge acquired (why ?, what for ?, for what reason ?, how to explain it ?, etc.).

In various kinds of independent work, TAB cards (tentative action basis) are used, each consisting of three parts : content (logic units of material being studied), techniques or methods of logic unit study and presentation (independent records of students in the process of performing the task). When organizing independent work, serious attention is paid to efficient forms of control. Graphological structures are one such method used both for assessment of material studied and when studying a new topic.

New methods of control are used along with traditional ones, e.g. programmed control which allows (using xeroxcopies, diazotype copies or diazocards) a rapid assesment of students' knowledge to be made.

Programmed control helps to make students more active during the whole lesson, develops their ability for independent, creative thinking, promotes a quick contact between students and teachers.

Also applied are such methods of active training as cross, front and compact questioning when a group is divided into two or three parts (in rows) and each is assigned a task ; self-questioning when all students of the group are ready to act both as teacher and as student. In this case the teacher can judge the degree of comprehension of the material even from the questions the students prepare to ask their classmates.

Oral reviewing by students of the answers made by their classmates may also take place at the lesson. This method helps to stir up thinking abilities and attention of students.

The so-called mathematical, physical and technical dictations which are so popular among agricultural college students take from 10 to 20 minutes of a lesson and are also of help in assessing the student's competence in a particular material.

The competitive method is used to increase the students' activity in studying a theory of some topic. A group is divided into two sub-groups. Students prepare beforehand theoretical material on the assigned topic and put down ten questions on separate sheets of paper. A correct answer or an expertly put question is appraised at one point. The students of both groups put their questions and make their answers alternately. The teacher analyses questions and answers of both, sometimes makes additions, sums up and puts his marks.

At some agricultural colleges of the Republic reference synopses are used at lessons. In order to attract attention of students to a new topic, to teach them to be self-dependent in acquiring knowledge at the beginning of the lesson, the teacher suggests that students study this topic independently (if possible).

For this purpose, the reference synopsis is projected on the screen by means of a codescope. The work proceeds with the reference synopsis and textbook simultaneously. The teacher explains only the most difficult problems. Work on the topic is accompanied by demonstration of experiments. Tables are also used, by which students answer questions, making possible assessment of results.

So-called compact questioning is a common practice at such lessons. Four students prepare themselves for 10 to 15 minutes at the blackboard to report using their cards. The rest of the group are at their places working independently on their written problems. During the time allotted for questioning, the teacher receives from eight to ten oral answers and makes an assessment of eight to ten written tests. So at each lesson the teacher is able to test from 60 to 70 per cent of students.

Homework consists of reading and understanding the material to be studied at the next lesson and of finishing up problems for those students who failed to do so during the lesson (with subsequent testing). Such a method makes it possible to engage all students in active study of a new topic. Students show interest in this work since they know that most of them will be questioned. With this form of lesson organization, the progress of students in a particular subject becomes noticeable.

Physics teachers use more extensively the method of drawing up block diagrams in their lessons. At the beginning of the lesson, the teacher presents his material in the form of a lecture, whereupon students supervised by the teacher proceed to draw up block diagrams on this material. The first block diagram is presented by the teacher on the blackboard or wall chart and is accompanied by explanations as to how it is drawn up and the students copy it into their note-books. The students are then given a couple of minutes to put their notes in order

and examine the block diagram, after which the teacher reads it out and suggests that students do the same.

The students learn quickly how to make synopses using block diagrams, while using this technique makes them grasp new material easier, develops in them logical thinking, helps them relate phenomena, notions and events.

For several years agricultural colleges have been engaged in the experiment of applying a **lecture-practical method** to the study of physics using the synopses of generalized knowledge.

The following training and methodological materials have been worked out for teachers and students of experimental groups :

1. Tentative plan of physics topics.
2. Methodological recommendations for designing sign models in physics.
3. Supplements with methodological recommendations for designing sign models in physics.
4. Methodological guide "Sign Models in Physics".
5. Supplements to methodological guide "Sign Models in Physics".
6. Collected problems in physics for a semester.
7. Educational and cognitive activity of students and ways of improvement (Methodological recommendations for students).
8. Organization of training on the basis of combined structural sign models (Methodological recommendations for teachers).

The following main ideas and concepts are used in the lecture-practical method :

- concept of unity between training and education ;
- concept of active interaction of teacher and students in the process of studying the subject (participation of students in the process of training and education) ;
- elements of group training with account of individual features of students ;
- expanded training material (training dose) as a means of practical orientation in the study of the subject ;
- continuous control (introduction of a system of control) ;
- account and use of intra-subject and inter-subject relations ;
- more important role of independent work both at the teacher-supervised lessons and out of school ;
- coding of knowledge by means of synopses of generalized knowledge ;
- repeated study of new training material.

The lecture-practical method does not exclude traditional methods but provides for their combination.

Based on the analysis of the teaching experiment data it follows that the lecture-practical method of studying a subject (in this case physics) has advantages over traditional methods.

This method allows a more complete accomplishment of tasks on education of students. In so doing the teacher-experimentators indicate that :

- a sense of collectivism is developed in students ;
- an atmosphere of benevolence is set up ;
- mutual assistance shows up more vividly ;
- better attitude is felt to the study of physics and to the training process as a whole.

Students note that the lecture-practical method has helped them to make friends, made them confident in their powers, increased their interest in studies.

The results, study and analysis of the data of the teaching experiment make it possible to draw the following conclusions :

1. The lecture-practical method making use of synopses of generalized knowledge combined with traditional methods permits attainment of a higher standard than do traditional methods.
2. The lecture-practical method requires the appropriate educational and methodological materials.
3. The use of the method is efficient, with the standard of student training being rather high : the average mark of a group is not lower than 3.4-3.5, good and excellent marks in physics in the groups on the eight-year school basis make up from 40 to 50 per cent.

Technical creative work is one of the methods used for increasing the efficiency of the educational process, stirring up students' thinking activities at all stages of study, and stimulating creative thinking.

For the first time in the country, such optional subjects as "Principles of technical creative work" (for technical specialists) and "Experimental work of specialists" (for non-technical specialities) were introduced into curricula.

Persistent research into new ways and methods of training based on scientific and technological advancements, promotion of the effectiveness of training, development of creative activity among students, preparation for practical work - these problems are central nowadays. **Stimulating gameless and game methods** seem to offer the most efficient solution to these problems. The method of production (specific) situations has found the most extensive application among gameless simulating

methods. This method seems to be most feasible when an individual complicated economic or managerial problem is dealt with and the content and form of studies are brought closer to real production conditions.

At lessons involving the use of production situations a number of problems are set before the students, impelling them to find efficient solutions on the basis of vocational skills and theoretical knowledge.

Proper handling of production situations is carried out by practical actions on the part of students backed up by visual perception and abstract thinking.

The aims of creating production situations at lessons are the following :

- to help students to define the core of a production problem and properly formulate it ;
- to stimulate students' interest in finding ways of solving the problem ;
- to help students efficiently to apply their knowledge and professional experience to solving the problem ;
- to set before students a problem the solution of which requires maximum stimulation of thinking ;
- to arouse students' aspiration to obtaining additional knowledge by demonstrating contradictions between the interest and impossibility of its satisfaction by means of available skills and theoretical knowledge.

When speaking about forms, methods and means of teaching, it is necessary to underline the fact that their formalistic use or "piling up" at one lesson is inadmissible. The efficiency of employing teaching forms and methods can be achieved only through a creative comprehensive approach to their selection and proper combination of "new" active methods with traditional ones. The afore-mentioned complexes of subjects' methodological provision render great assistance to teachers of specialized secondary educational establishments.

5.3. Teaching aids

The educational process at specialized secondary institutions of today is impossible without technical training appliances. Agricultural colleges of the Republic are provided with diversified equipment and instrumentation - from the most simple projectors to video cameras and closed-circuit television centres. The teaching bodies deal with the problems of effective use of technical training appliances in the educational process.

In using technical teaching aids in lessons, teachers should have a creative approach in choosing audio-visual aids taking into account the actual knowledge and skills of students. For example, literature lessons will only benefit from the alliance between the teacher and "intelligent" machines. But machines should not replace the teacher. It is

necessary that the attention of the teacher and students be concentrated on a literary work rather than on a machine. Other arts (painting, music, recitation) should regularly be used during lessons not only as audio-visual aids but as a means of aesthetic education of students.

Film-strips are apprehended with great interest at lessons, since students, while watching the screen, have an opportunity to comment. A great volume of educational information contained in film-strips makes it possible to carry out a variety of work using the following methods :

1. Film-strips can be used at the first stage of working on a new topic to become acquainted with the era of the events in question.
2. Demonstration of film-strips after a literary work has been read offers a means of determining whether students know its content, and, if they do, of attracting their attention to some episodes needing explanation.
3. Demonstration of film-strips may be used for preparing students for reading and understanding the book.
4. Demonstration of film-strips can be used when studying review topics.

Film-strips therefore play an important part in helping students to imagine that period of history when the book studied was written, enriching their conception of life and people through documentary materials. Film-strips help to obtain a deeper grasp of words written by a man of letters.

Listening to records during literature lessons helps to set a lyrical mood, to become acquainted with expressive recitation, with an opera staged on the literary work.

Teachers involve students in work with technical training appliances. When arranging literary and music parties, they make use of tape-recorders, illustrations and slides.

Film fragments also play a significant role in the training process. Two or three days before the lesson, the teacher demonstrates to students a most vivid fragment and asks them to think at home over a comparison analysis.

The efficiency of technical training appliances in the educational process depends not only on their combined and reasonable use but on the standard of methodological support.

A large number of specific methods have been developed at specialized secondary educational establishments of the Ukrainian SSR for using technical training appliances, film-strips and slides have been made. Many technical and agricultural colleges have started shooting training films, at some agricultural colleges the systems of optimal use of

closed-circuit television centres in the educational process and out-of-school work have been developed.

Television finds application at agricultural colleges not only in the process of studies but also in methodological work. The available video recording facilities provide a means for high quality analyses of open lessons. Demonstration of documentary and feature films has become possible thanks to television. At parents' meetings, the class teacher has an opportunity of showing how the best students work during lessons.

Television has certain advantages over other technical training appliances : 1) It allows combined use of teaching aids ; 2) It is more reliable than other projection facilities ; 3) video plans are simpler to make than codegrams, slides, etc. ; 4) a television screen requires no blackout ; 5) compared to wall charts, video pictures concentrate students' attention on a smaller area.

The role of technical training appliances has lately grown considerably due to wide-scale introduction of computers into the training process. In tackling the universal problem of computerization, it is necessary to introduce computers and microprocessors into the educational process in the shortest possible time so that computers can be used for solving problems, analyzing data concerning the teaching experiment and carrying out studies of phenomena and processes. Computers should certainly also be used as an active training facility.

In accordance with the existing curricula for technical, agronomic and zootechnical trades, each specialized secondary educational establishment is provided with physics, chemistry, general biology laboratories and technical training facilities, as well as rooms for mathematics, literature, foreign languages, etc.

These rooms and laboratories are constantly equipped with new teaching and visual aids, models, technical training facilities, computers according to standard lists of equipment to be available in these rooms and laboratories.

In order properly to employ technical training means, each agricultural school has laboratories and rooms provided with window blacking-out devices, special tables and other equipment making it possible to display the required information on blackboards or screens. Wide use is made of film and slide projectors, facilities for programming control over students' knowledge, operating units and their models, teaching devices on various subjects, films and slides. The latter are used not only for illustration of theoretical material but also for generalization and systematization.

Films and slides are usually used prior to carrying out practical and laboratory work. They also greatly help students in their individual work. Sound recording is also a popular teaching method. Radio units and television sets function in all general subject rooms and laboratories.

Today there are three conditions necessary for efficient employment of educational films and slides :

- availability of adequate training and laboratory bases (films and slides) ;
- methodological provision for using films and slides in the teaching process ;
- proper storage and use of films and slides.

Agricultural secondary institutions of the Republic boast over 2,000 film projectors, about 200 video tape recorders, more than 1,000 television sets, the same number of slide projectors, while the stock of films and slides amounts to some 10,000 and 150,000 respectively.

The number of lessons using technical training facilities makes up 80 per cent of each teacher's workload. Broad opportunities are created for scientific and teaching data exchange.

Introduction of computers into the teaching process will considerably increase the number of technical training facilities. Schools are constantly provided with teaching complexes, personal computers displaying on a television screen the data recorded on videotape or videodisc.

Teaching facilities being efficiently used by experienced and skilled teachers help realize the following tasks :

- the comprehensive revelation of the essence of objects, phenomena and production processes under study ;
- the more efficient realization of the main principles of didactics during the teaching process ;
- better organization of students' individual studies intended for the assimilation of knowledge and obtention of required skills ;
- ensuring the organic unity and proper correction of the teaching process.

Language laboratories are widely employed in the teaching process in order to raise the efficiency of the data transfer and to develop speech habits. All laboratories are provided with sound recording and reproduction facilities, film and slide projectors, making it possible to use audiovisual methods for creating adequate conditions for individual work. Such laboratories help students to learn foreign languages properly and foreign students to study Russian.

In these laboratories, tutors can set individual or group tasks and exercises and control students work by switching in to any individual workplace via the console. In language laboratories, students fulfil the following kinds of work : listening through headphones to the tutor's instructions, texts and music from magnetic tape and records ; carrying out verbal exercises to improve pronunciation and develop habits of idiomatic speech perception ; learning the technique of reading and its demonstration to the entire class or the tutor through headphones or microphones. In the said laboratories, tutors can speak

with a student without interrupting the others or connect students in pairs to check on their work and develop dialogue habits.

All this stimulates students' interest in studying foreign languages, helps increase their attentiveness and activity during lessons.

Language classes are extremely useful for homework, improvement of pronunciation and development of versatile speech habits.

The experience proves that the best results in language studies are achieved by those tutors possessing the adequate number of didactic materials within the teaching and methodological complexes. These materials involve phonetic exercises ; special standard texts reproduced with or without intervals ; plot-based texts ; dialogues of various kinds ; recorded speeches of prominent teachers and concerts of artists ; texts with dictations and translations ; texts for the sound tracking of slides, educational films, and so on.

The expediency of selecting the teaching forms, methods and means should be assessed by the final results allowing for time losses, efforts exerted by students and tutors in order to achieve training goals.

One of the main criteria of teaching skills is the ability to select and properly use those teaching forms, methods and means which provide students with the required amount of knowledge and help train them for active and creative work.

The amount of knowledge of general subjects in agricultural schools should be equal to that in general secondary schools, thus providing for adequate theoretical training which permits graduates of specialized educational establishments to obtain the knowledge corresponding to existing standards of general secondary education.

Development of continuity between various levels of educational sub-systems creates the prerequisites for realizing an important socio-economic task - to train both (in the shortest possible period of time) degree specialists possessing the highest skills in related fields from among diploma graduates of specialized secondary educational institutions and diploma technicians from among vocational school graduates.

6. TEACHING STAFF

The quality of training greatly depends upon the teachers' work, the ability to raise their ideological level, increase the amount of theoretical knowledge and improve their professional skills. All tutors teaching general subjects have higher education, and are also characterized by a high level of culture, erudition and an adequate knowledge of their subjects.

According to the approved schedule, during each five-year period teachers attend two-month advanced learning courses functioning at the corresponding chairs in institutions of higher education.

The following measures are taken in order to upgrade the quality of teachers' advanced training :

- the curricula and syllabi of advanced training faculties are worked out in common ;
- agricultural colleges' teacher training is organized at the corresponding chairs of the institutions of higher education ;
- short-duration seminars are held at the said chairs for teachers who are members of general subject commissions functioning at technical schools ;
- common sessions of inter-regional scientific-methodological councils of the higher educational and regional methodological associations of technical school teachers are planned.

Each year in August, two-day regional conferences of teachers from specialized secondary educational establishments are organized which, apart from plenary sessions, also involve the work of subject-based sections.

From 1987 onwards, teachers of general subjects at technical schools will improve their professional skills at regional advanced teacher training institutes.

Teachers of general subjects form the subject-based (cycle) commission at each educational establishment. Pursuant to the pertinent rules, the commissions, headed by chairmen, plan and help carry out the entire teaching and educational work of the teachers involved in a cycle.

7. SECONDARY AGRICULTURAL VOCATIONAL EDUCATION IN THE UKRAINIAN SSR

The system of vocational education, which has been created in the USSR, is part and parcel of the people's education, the main source of preparing skilled workers.

In 1984, all vocational educational establishments existing in this country were recognized as secondary vocational schools having departments distinguished by trades and terms of study depending on the educational level of entrants. These schools turn out skilled workers with a certificate in a trade plus a full certificate of general secondary education. A three-year training term has been fixed for young people who have finished eight grades of comprehensive secondary school. As far as secondary school graduates are concerned, their term of training varies (usually not over one year) depending on their initial vocational skills and the complexity of the trade chosen. This term is reduced from one year to six to eight months for those secondary school gra-

duates who learnt the corresponding or related trade at specialized inter-school training centres.

Today, secondary vocational schools are the main source for turning out skilled industrial and agricultural workers.

Secondary vocational schools preparing young workers for agro-industrial complex hold a prominent place within the Republic's vocational education system (27.3 per cent of the total number). The demand for skilled workers for agriculture is determined in five-year and annual socio-economic development plans. The State Committee of the Ukrainian SSR, regional boards and separate schools of the vocational education system are responsible for fulfilling plans for enrolling youth in the said schools and turning out skilled workers. The State Committee for Vocational Education determines the list of trades in due course.

Rapid scientific and technical progress, sophistication and intensification of technological processes, requirements of mechanization and automation impose new requirements on vocational education, the basic tasks of which are as follows :

- considerably expanding the training of skilled workers, allowing for the national economy's demand ;
- providing all young people, if they so wish, with an opportunity to learn a trade prior to commencing their labour activity ;
- ensuring general education of pupils pursuant to the common requirements placed on this country's universal secondary education ;
- accomplishing school reform, that is, supplementing universal secondary education of youth with universal vocational training ;
- training harmoniously developed, competent and highly skilled workers capable of meeting the requirements of modern industry, scientific and technological progress and development prospects ;
- forming in pupils a scientific world view, Soviet patriotism, socialist internationalism, active life stand, modern economic thinking, creative attitude to work ;
- creating the necessary conditions for engaging students in physical culture and sports, art and technical creative work.

Sophistication is a major trend of production which results in a rise in the role of mental work, intellectualizing labour activities of workers, emerging new trades and broadening the scope of training workers with versatile skills. Secondary agricultural vocational schools train such workers in the following combined trades : tractor driver-machine operator capable of working as a maintenance man ; machine operator of cattle-breeding complexes and mechanized farms capable of working as an electrician ; machine operator of poultry plants and mechanized farms ; machine operator capable of working as a chemical analysis lab assistant ; adjuster of control and measurement instruments and automatic devices of agricultural production ; setter-up of agricultural machinery engaged in balanced fodder production ; veterinary surgeon assistant ; machine operator engaged in land reclamation work, etc. Students are also trained in such areas as plant growing, storage

and processing of agricultural products, namely, vegetable growing, horticulture and decoration ; grape growing ; operators of refrigerating machines, etc.

Quite a few secondary agricultural vocational schools have branches, evening departments and refresher courses.

According to the Regulations on secondary vocational education, day departments enrol persons under the age of 30, while no age limit exists for those wishing to enter evening departments or refresher courses.

In the Constitution of the USSR and those of other Union Republics, the Soviet legislation guarantees young people equal rights to education and training for labour activity regardless of their race, religious beliefs, social or property status. Vocational school graduates are guaranteed the right to be provided with a job according to their trade. Those who have passed final examinations with distinction or with credit may enter institutions of higher education on recommendation from the school staff immediately after finishing secondary vocational school. Graduates having school-leaving certificates with distinction have certain advantages when obtaining jobs or entering higher institutions.

Admission to secondary vocational schools is carried out without any exams. Entrants simply submit the document concerning their education and health certificate testifying whether or not they are fit for a chosen trade.

Vocational students admitted after lower secondary education are provided with a full maintenance allowance, while secondary school graduates receive grants. Students sent to vocational schools by collective and State farms continue to receive their average wages. All students in vocational schools receive 50 per cent of the money they earn in the course of their practice. They are also provided with free manuals and, if necessary, with places in dormitories. Schools dispose of all necessary sports facilities, and offer opportunities to take part in amateur art and technical activities. Vocational school facilities including premises for theoretical studies and practical training, clubs, hostels and canteens, sports halls and stadia are being expanded. Secondary vocational schools also dispose of adequate teaching and material facilities, modern agricultural machinery, agricultural land the area of which ranges from 250 to 450 hectares, and cattle-breeding farms. All this makes it possible to bring closer together the students' practical training in real conditions of their future work in agriculture. New forms of industrial training are being developed, such as work team training based on engagement of students in practical work in the fields on livestock farms within mechanized teams and sections, the arrangement of work being according to team contract methods. Students' industrial training efficiency is also enhanced through creative collaboration of the schools with scientific establishments which render assistance in organizing and carrying out practical work in experimental fields.

Educational groups are formed according to the trade principle. As a rule, a group consists of 25 to 30 pupils. During industrial training, a group may be split up into two sub-groups. Laboratory-practical studies are conducted according to the section principle (10 to 15 sections). In most secondary agricultural vocational schools, teaching is carried out in the Ukrainian language.

Vocational and general education in the said school is performed on the basis of relevant syllabi and curricula approved by the State Committee for Vocational Education. They serve to establish the scientifically grounded sequence and relationship between practical training and theoretical studies, to ensure the proper selection of subjects for each particular grade and fix the periods for their learning, to define the way of organizing industrial training and practical work, as well as the terms for holding exams and vacations.

Since 1985, the educational process in many grades has been organized according to new syllabi. The courses "Fundamentals of informatics and computer science", and "Computer based automation of production", have been introduced into all secondary vocational training establishments.

Curricula are constantly amended and expanded with due regard to the latest technological achievements. Today, all students study the new subject "Efficient forms of workers' labour organization and stimulation". In so doing, special attention is paid to providing students with practical knowledge in such fields as new economic approaches, team contract methods, putting industrial enterprises on a self-supporting economic basis, material and moral stimulation according to final labour results. The study of intensive technologies of agricultural production in the fields and on livestock farms has been introduced into the course "Organization and technology of mechanized work in agriculture".

Similar to other educational establishments, secondary agricultural vocational schools open on 1 September. The school year is split into two semesters. The time-table of classes is made for each half-year period.

8. CONTENT OF GENERAL SUBJECTS

In secondary vocational schools, general secondary schools and secondary specialized educational institutions, general education is provided pursuant to common standards concerning subjects being studied, their extent and contents. The reform of general and vocational schools has set the task of providing students with a solid basis of science and applied knowledge (technical, agronomic and other special subjects) to meet the requirements of scientific, technological and social process, to teach students how practically to use the knowledge obtained.

Learning the fundamentals of the sciences helps workers acquire versatile skills, and serves as the basis for engagement in creative activity, forming scientific outlook and developing their intellect.

The unity of theory and practice in secondary vocational schools is achieved through inter-relationship of general and vocational education, and the enhancement of vocational direction in the educational process.

The study of general subjects is carried out in accordance with the new modified curricula for nine to ten grades of general secondary schools approved by the Ministry of Education. These curricula have the following features :

- reflection of the latest achievements in science, technology and practice ;
- enhancement of general culture and polytechnical trends ;
- a greater share of practical and laboratory classes, technological application of physical, chemical, biological and other scientific phenomena ;
- precise definition of the obligatory skills and knowledge to be learned for each subject ;
- clear presentation of interdisciplinary and intradisciplinary lines and requirements being imposed on the organization of the teaching process ;
- availability of time for recapitulating material studied ;
- provision of norms for assessing students' knowledge and skills.

In order to ensure the vocational orientation of the educational process, teachers may supplement or correct curricula allowing for specific features of trades.

The cycle of general education subjects in agricultural vocational schools is common to all trades, that is, an equal number of school hours is given to studying general subjects in all curricula (Table 5). The said number of hours for studying Russian and Ukrainian language and literature is allotted to each language, thus increasing the total number of hours by 210.

General subject hours constitute 45 per cent of the total, the ratio of these subjects to general technical and special ones is actually the same as that in secondary specialized educational establishments. The total number of hours for the vocational and technical cycle is 2583.

The curriculum is designed in such a manner that teaching mathematics, physics and chemistry is completed in the second year of study. This makes it possible to create an adequate theoretical basis for studying special subjects and comprehensive practical application of the knowledge obtained.

Table 5
General subjects for agricultural vocational schools

Subjects	Total number of hours	Out of them	
		Theoretical training	Laboratory and practical training
1. Russian and Ukrainian language and literature	210	210	
2. Mathematics	295	295	
3. Physics and astronomy	289	248	41
4. Chemistry	177	157	20
5. General biology	65	60	5
6. Economic and social geography	55	55	
7. History	236	236	
8. Social science	70	70	
9. Ethics and psychology of family life	30	30	
10. Fundamentals of informatics and computer science	101	101	
11. Foreign language	70	70	
12. Physical training	181	181	
13. Initial military training	138	138	
TOTAL	1917	1851	66

As far as the contents, duration of learning and number of general subjects are concerned, the general education cycle provides students with adequate knowledge to obtain the secondary education certificate and to continue study at an institute of higher learning.

9. INTERDISCIPLINARY APPROACH AND VOCATIONAL TRENDS IN TEACHING GENERAL EDUCATION SUBJECTS

Vocational education and training imposes certain effects upon the content of general education subjects. Learning the fundamentals of science is closely interconnected with vocational and technical subjects taking due account of specific features of agricultural production and relevant trades. Such an approach presupposes the establishment of intercycle and interdisciplinary connections and the realization of the principle of vocational trends in teaching general subjects. Natural sciences and mathematics form the basis of polytechnical and vocational education of future operators of agricultural machinery and stock breeders. Tutors therefore supplement the subjects with data pertaining to the latest scientific and technological achievements and their role in agricultural production development. Students are provided with information about modern and future production processes, advanced methods of work and practical application of theoretical knowledge in agriculture.

Expansion of the scope and versatility of thinking is inseparably linked to raising the efficiency of interdisciplinary ties.

Adequate content and logical integrity of general subjects, formation of common scientific notions, polytechnical knowledge and skills, common measurement units and terminology serve to establish interdisciplinary ties and provide for organic unity in the entire theoretical training. When studying various instruments, machines and mechanisms, students have a unified approach to understanding their purpose, principles of operation and area of application.

Natural sciences and mathematics are taught not only for the sake of their specific tasks, but also for establishing a theoretical basis in order to master specific technologies and properly learn a chosen trade. Diverse are the ways of creating strong ties between theoretical study of science and vocational training. These involve, for example, the inclusion of vocationally oriented data into the material being studied; the use of theoretical knowledge for elucidating production aspects; students' reports on practical application of theoretical knowledge; solution of relevant problems; visits to industrial and agricultural enterprises; fulfilment of tasks of an interdisciplinary nature, and so on.

When studying chemistry, for instance, special significance is attached to notions about solutions, their physical and chemical properties, about agro-chemistry and chemistry of metals. Intercycle ties are

most efficiently used when studying such topics as "Theory of electrolytic dissociation", "Nitrogen and phosphorus", "Hydrocarbons", and others.

Solution of production-associated problems is a major means of realizing vocational direction of the teaching process. The subjects of the vocational cycle and productive training are the basic sources for obtaining initial data for composing vocationally oriented mathematic, physical and chemical problems.

For instance, such problems on chemistry are set up in the following way :

- the problem specification indicates the ways of obtaining a substance and its application in agriculture or industry ;
- the problem discovers the chemical aspects of a technological process and requires an equation of chemical reaction to be worked out ;
- the problem also involves the scale of production, technological, technical and economic solutions.

When students are working in laboratories or carrying out practical work, teachers focus their attention upon finding certain physical and chemical regularities with which students will meet in their productive activities. In imparting vocational direction to the practical part of the curricula, teachers help enrich the production experience of students. Complex laboratory and practical work is often carried out covering both mathematical and natural science subjects and technical/vocational subjects, provided they are close in content. For instance, the groups of agricultural-machine operators carry out laboratory and practical agronomic studies on the topic "Plant protection from pests and diseases" in experimental fields performing complex tasks worked out by teachers of different subjects. Teachers elaborate common requirements concerning the way in which these studies are carried out, dividing the task into corresponding stages, providing theoretical substantiation and presentation of relevant reports.

Imitation of production situations, use of mathematical and graphical symbols, generalizing tables and charts promote the realization of an interdisciplinary approach to the educational process and vocational direction of the teaching of general subjects.

Vocational trends in studying the Russian and Ukrainian languages aims at acquiring all kinds of speech habits, learning special terminology and ways of communicating within the sphere of production activity. The work over scientific style of speech is intended to accustom students to the language of their trade, to scientific and technical literature, and to develop the ability of correct use of dictionaries and reference books.

At literature classes, students study the works of classical and contemporary writers, learn to understand correctly such moral and ethical categories as duty, honour, responsibility for entrusted duties,

as well as the nature of labour feats, the essence of innovation, the interrelationship between individual and collective, continuity of generations, and the like.

As regards secondary agricultural vocational schools, the most significant interdisciplinary ties are those with biology courses. Study of certain special subjects is based on a knowledge of botany, zoology and anatomy, obtained by students at lower secondary school. The biology course being taught during the third year of training at vocational school is of a generalized character thus making it possible to establish logical links of this course with physics, chemistry, special subjects, and to use data of an interdisciplinary nature for systematization and generalization of the material being studied, for forming the proper world outlook in pupils.

A knowledge of the fundamentals of biology serves as a basis for special subjects being learnt at different agricultural vocational schools. These subjects involve the fundamentals of agronomy (when training agricultural-machine operators); the fundamentals of irrigated agriculture (irrigation workers); the fundamentals of agricultural and soil science, vegetable and fruit growing (for workers engaged in these fields); etc.

Learning the fundamentals of agronomy is directly connected with the material on botany involving such aspects as plants and their life conditions; soil and its fertility; cultivation of land, sowing and planting; crop cultivation; protection of plants from pests and diseases.

Future specialists in dairy and meat husbandry, milking-machine operators study the special subject "The fundamentals of cattle-breeding". A section on "The fundamentals of cattle anatomy and physiology" presents information on cells, tissues, the system of blood circulation and the flow of lymph, respiratory, digestive, discharge organs, etc. A section on "Pedigree stockbreeding" deals with the fundamentals of genetics, the origin and breeds of cattle and other aspects which are the object of more detailed substantiation in the general biology course.

The ties between biology and physics are also realized during the study of special subjects. For instance, the subject "Fundamentals of cattle-breeding" includes such topics as metabolism and energy exchange in an organism; chemical composition, nutrition and digestion property of fodders, their classification and characteristics.

The said ties are further strengthened when learning such special subjects as "Organization and production technology at animal complexes and farms". For example, the section "Organization and technology of fodder procurement and storage" considers the role of active ventilation (connection with physics) and the application of chemical preservatives and various additions for improving the nutritional value of silage crops (connection with chemistry).

The study of cell structure and functions in plants and animals, respiratory, digestive and discharge processes, and energy exchange is based on relevant physical and chemical knowledge.

Live matter functions, the content and purpose of chemical agents in cells are taught on the basis of knowledge pertaining to types of chemical bonds and the properties of oxygen, nitrogen, sulphur and carbon.

The general biology curriculum contains numerous references to the connection of biological regularities with agricultural production. In particular, the introduction to this course underlines the importance of biological science for agriculture. The theory of selection, heredity, mutation, the struggle for existence are considered in the topic "Evolutionary theory" as the basis for breeding domestic animals and cultivating crop plant varieties. Students learn how to use the theory of evolution in agricultural practice and in the protection of Nature. The topic "Fundamentals of ecology" involves the study of the problems of raising the agrocenoses efficiency on the basis of land reclamation and introduction of new plant-growing technologies.

Taking into account the study of metabolism and energy exchange, the "Fundamentals of cytology" course elucidates ways of enhancing the productivity of agricultural crops. The fundamentals of genetics and selection, included in the general biology course, is closely connected with agricultural aspects.

Thus, interdisciplinary approach and vocational direction of teaching general subjects contribute to the improvement of the process of training skilled workers able to work under conditions of scientific and technological process acceleration. Such an approach and orientation also favour the formation of a scientific outlook, an integral system of knowledge and abilities to acquire knowledge and use it in practice.

10. ECOLOGICAL EDUCATION

The problems of biological and environmental conservation as well as Man's interrelation with Nature are of great significance for agricultural workers inasmuch as they ensure strict observance of the laws concerning protection of Nature and rational use of natural resources.

Topics for studying these problems have been included in the curricula on special subjects, biology and geography. Ecological education is carried out in a comprehensive manner on an interdisciplinary basis both during classes and in out-of-school activities.

Courses on special technology in secondary vocational schools serve to demonstrate the role of science in solving Nature protection problems, their significance for agriculture, ways of protecting the air,

water and soil against pollution, and natural resources and energy against waste. Courses also provide information on the rational use of natural resources and their significance for the national economy, Man's vital activity and coming generations, and on measures being taken by the State in order to protect Nature from the adverse after-effects of industrial activity. Apart from this, separate aspects of the same problems are included in other special subjects.

For instance, future stockbreeders are familiarized with measures concerning the protection of the environment from animal husbandry production wastes, on preventive treatment of soil and water.

The course on "Tractors and motor vehicles" (for the trade of agricultural-machine operator) allots time to studying environmental protection measures when starting up and stopping engines. Pupils are also taught how to avoid pollution caused by lubricating oil, exhaust gases, fuel, etc.

The course on "The fundamentals of irrigated agriculture" (for the trade of irrigation workers) involves studying measures to prevent both the bogging of irrigated lands and water erosion. Future vegetable and fruit growers learn new plant protection trends, in particular integral and combined methods.

When teaching such general biology topics as "The fundamentals of ecology" and "Man and the Biosphere", special attention is focused on measures aimed at improving crop environments, the use of comprehensive measures to prevent the spread of crop diseases and pests, and the establishment of ecologically closed agricultural production systems.

In physics classes, students learn about updating production processes, industrial equipment and means of transportation, which serves to upgrade the quality of raw materials and fuel, reduces the amount of noxious substances in the atmosphere and improves stack gas cleaning from harmful mixtures. Pupils also study ways of using secondary resources and byproducts.

Knowledge about Nature conservation is treated in greater depth in chemistry lessons when studying the relevant production processes.

Special importance is attached to the problem of water cleaning, replacement of water cooling systems in industrial units by air cooling ones, water circulation arrangements, creation of industrial enterprises having closed water supply cycles without sewage discharge into open water reservoirs, and so on. A great deal of time is allotted to studying waste-free technologies and the use of secondary raw materials.

Teachers of general and special subjects join forces to realize ecological education of students in an efficient manner.

Special interdisciplinary seminars and conferences are often held at secondary agricultural vocational schools; students are involved in research work and take an active part in the protection of forests and

water reservoirs : they plant trees in parks and gardens, and raise aquatic birds and fish.

Students also often go on school tours, and participate in expeditions to acquaint themselves better with the Nature of their native country. Adequate conditions are created for conducting experimental work, and for setting up museums and nature-study rooms with exhibits.

A wide network of Nature lovers' clubs at secondary vocational schools makes it possible to carry out a great amount of educational work on ecological problems, form in students a considerate attitude to Nature and an aspiration for increasing its wealth.

Such an attitude is created by promoting environmental education based on the organic unity of ecological knowledge and students' participation in environmental protection arrangements and rational use of natural resources.

11. TEACHING METHODS AND AIDS

Specific features of secondary vocational agricultural schools, the change in content of general subjects, the tasks of cardinal upgrading the quality of training set by vocational school reform require new approaches to teaching the fundamentals of science. Perfection of teaching and educational processes presupposes their updating and the introduction of more efficient teaching methods. Nowadays, the teaching staff of vocational schools practically realize the task of updating teaching methods and facilities and of enhancing vocational trends in teaching.

Reform requirements are to upgrade the quality of training and education, to attain a higher scientific level of teaching in each subject, to define more precisely the volume, notions and main ideas of the material being studied, and to determine the necessary scope of skills needed for learning the chosen trade. These requirements form the goal-oriented range of teaching problems.

In the system of vocational education, general methodological guidance over the teaching and educational process is exercised by the All-Union Scientific and Methodological Centre of Vocational Education. In the Republics, such guidance is carried out by Republican Methodological Departments, and in the regions by the Regional Methodological Departments. In addition, there are methodological boards at all levels, that is, methodological sections at Regional Departments and methodological commissions for teachers of all subjects at vocational schools. Special methodological rooms are centres of methodological activities at secondary vocational schools. These rooms contain reference books, teaching aids, recommendations, planning documentation, descriptions of advanced experience, etc. In recent years, the Republican and regional schools of advanced teaching experience have gained great popularity. Here,

teachers have broad access to the latest achievements of pedagogical theory and practice. Schools of this kind also function at secondary vocational establishments.

Teachers are also offered a great amount of teaching aids and relevant mass media information.

Adequate conditions for individual and collective creative work are provided at each secondary vocational school in order to improve the teaching process and achieve good final vocational education results.

At present, the educational process planning is also oriented towards organic combination of common goals and perspective trends with the existing problems of each vocational school. Such planning is based upon the target-oriented complex programme "General Education" worked out by the UkrSSR State Committee for Vocational Education. A special of this programme presents a number of measures aimed at providing a qualitatively new level of general education. This means, first of all, introduction of new active teaching methods; an algorithm-based approach to developing practical skills; wide use of reference abstracts, tables, diagrams, computers, TV teaching facilities, language laboratory equipment and other technical means; employment of computer and non-computer programming, business games, logic problems, special cards containing production-associated tasks; teaching students how to make proper use of manuals, dictionaries, reference books, etc.

Apart from traditional forms of the teaching process, lectures, seminars, lesson-conferences and lesson-contests are gaining popularity. Great attention is paid to the development of general and applied skills, fulfilment of various individual tasks, making reports during classes, and so forth. Active teaching methods based on close co-operation between teachers and students are intensively introduced, the former teaching while the latter take an active part in the teaching process.

Many teachers use the step-by-step teaching technique involving an individual approach to students. This helps achieve the following:

- continuity of the teaching process, determination of students' level of knowledge, acceleration of adaptation to new conditions at secondary vocational school;
- teaching the pupils how to grasp the main idea contained in the material being studied, to make notes and summaries, to solve different kinds of problems, to apply theoretical knowledge practically;
- making pupils able to generalize the material studied and systematize it topic-wise, to compile tables, logical patterns for fulfilling individual tasks and answering concrete questions, to carry out laboratory work properly and to use the knowledge and skills obtained practically in unusual situations.

Scientific and technological progress demands special skills of workers, for efficient solution of complex production problems. With this aim in view, an algorithm-based approach has been introduced for imparting practical skills to students, in using grammar rules, solving problems in mathematics, physics, chemistry, and in carrying out laboratory work. Such an approach makes it possible to classify and systematize skills mastered by students at different periods of time. The algorithm-instructions simplify and facilitate the process of carrying out a task and serve as a logical basis for purely automatic application of applied skills. These algorithms are given to students in the form of cards, instruction charts and tables.

Today a great deal of work is carried out on intensifying the teaching process, ensuring solid knowledge of general subjects, forming in trainees modern technological and economic ways of thinking, as well as a deep understanding of the scientific and technological foundations of agricultural production.

The quality of general education is also upgraded with the aid of numerous contests and olympiads on different subjects, scientific conferences, the establishment of student design offices at vocational schools, and intensive development of technical innovation and rationalization activities.

Methods for teaching general subjects are constantly perfected on the basis of broad use of problem-oriented training and intensification of individual learning activities on the part of students. Interdisciplinary seminars at agricultural schools are frequent, helping to cover the topic under discussion comprehensively. Teachers of mathematics, physics, and "Fundamentals of informatics and computer science" often hold seminars concerning the role of computers in accelerating scientific and technological progress. The same goes for the interdisciplinary seminar entitled "Nature protection", etc.

The curricula of all general subjects specify the requirements regarding students' knowledge and skills which are assessed according to a five grade system.

In the Republic's agricultural vocational schools, a systematic approach to examining, registering and assessing trainees' knowledge and skills has been introduced. This approach allows constant control over achievements, the observance of both the rules of education and the common requirements of quality of general secondary education. Broadly used today is topic-based evaluation of knowledge in all subjects and training cycles, and the test system for assessing the level of assimilation of programme material, of interdisciplinary tests and laboratory work.

Fundamental problems concerning the modern approach to training may be solved by means of traditional methods and advanced teaching experience, and by a proper combination of the two.

Teaching of general subjects at secondary vocational schools is considered to be an organic part of developing students' professional skills and general culture, and it is therefore extremely important to ensure an adequate balance between vocational training and general secondary education.

12. TRAINING FACILITIES AND METHODOLOGICAL PROVISIONS FOR TEACHING GENERAL SUBJECTS. TEACHING STAFF

The study of general subjects in secondary vocational schools is mainly conducted in special teaching rooms provided with the necessary equipment, technical facilities, teaching and visual aids and a variety of reference literature. Each school has a library containing an adequate stock of manuals, reference works, popular scientific and methodological literature, and fiction to meet the requirements of tutors and trainees. Schools are supplied with the required literature in a centralized manner.

The target-oriented programme entitled "General Education" makes provision for the creation of optimal conditions for teaching general subjects in secondary vocational schools. Purposeful work is carried out on the expansion and strengthening of training facilities and the material basis in the following directions :

- creation of new specially equipped study rooms ;
- adequate compliance of facilities available in teaching rooms with existing requirements, centralized supply of schools with projection and language laboratory equipment, films and film-strips, computer facilities, graphic projectors, etc. ;
- re-equipment of chemical laboratories for experiments using semi-microanalysis ;
- inspection of teacher and trainee workplaces in all study rooms and laboratories ; organization of Republican and regional reviews and competitions for the best study room ;
- bringing annually a certain number of study rooms for each general subject up to the level of model ones ;
- creation and intensive use of special teaching-methodological sets ; publication of didactic materials worked out by scientific pedagogical establishments and advanced teachers ;
- elaboration and publication of recommendations concerning the use of such technical facilities as language laboratory equipment, computers, programmed micro-calculators, etc.

Provision of study rooms with various kinds of equipment, and its application during classes, allows the teaching process to be organized in a manner which satisfies modern requirements. In the same way as their colleagues in secondary specialized educational establishments, teachers in agricultural vocational schools carry out a great deal of work perfecting the use of various visual aids, computer and language

laboratory facilities, as well as on the comprehensive methodological provision of the teaching process.

The vocational education authorities attach special importance to the proper solution of personal problems, that is, the correct selection, distribution and training of teaching staff. A special system for improving teachers' qualifications functions in the Ukraine. Each year, the demand of secondary vocational schools for qualified specialists is completely satisfied. A great deal is being done to use teachers rationally, and to improve their working and living conditions. The best teachers are morally and materially stimulated, awarded titles such as "Senior teacher", "Teacher-methodologist", "Merited teacher of the UkrSSR", "Excellent teacher of vocational education", etc.

Teachers in secondary vocational schools have the same status as their colleagues in general secondary schools and specialized educational institutions.

Adequate higher pedagogical education is the main qualification requirement imposed on teachers of general subjects. They are trained at universities and teacher training colleges pursuant to the curricula approved by the Ministry of Higher and Secondary Specialized Education and the Ministry of Education.

Within the framework of vocational education, there is a training scheme by which teachers are able to improve their skills every five years. In order to achieve this goal, the Republican Institute of Advanced Teacher Training has been set up to promote up-dating of the qualifications of teachers of general subjects in secondary vocational schools at institutions of advanced training and at teacher training colleges. Teachers also improve their knowledge at regional and republican schools of advanced experience, and take an active part in the work of methodological boards and commissions as well as in the organization of problem-oriented and practical seminars. "Teachers' libraries", "Libraries of Advanced Experience", and scientific and methodological journals are issued to keep teachers informed about new developments in their particular field. Conferences on exchanges of experience are organized every year.

Much has been done in the Ukraine and in other Union Republics to raise the social prestige of tutors and to create favourable conditions for their self-education.

13. CONCLUSION

Training middle-level managers and workers with versatile skills makes it possible to solve the problem of universal secondary education successfully, as well as its supplementation with vocational training. This permits adequate provision to agriculture of skilled specialists

and workers possessing the required level of theoretical and practical knowledge.

Socio-economic transformations in all spheres of public and production activities result in the establishment of a system of permanent education, continuous in all its stages, which helps to train young workers and specialists properly for efficient work under conditions of rapid scientific and technological progress, making them highly skilled persons possessing adequate theoretical and practical knowledge, capable of further raising their educational level.

A solution to the problem of establishing a unified level of general secondary education involves standardization of its fundamental basis with corresponding variations depending upon the type of secondary educational institution.

The work will be continued at secondary specialized and vocational institutions on further updating teaching methods and facilities, and realizing the main tasks set by vocational education reform on the basis of a closer interrelationship between general secondary and vocational education.

STUDIES IN TECHNICAL AND VOCATIONAL EDUCATION (cont'd)

13. Elaboration des programmes d'enseignement technique et professionnel - URSS (1983, French).
14. Content of General Education in Technical and Vocational Schools - USSR (1985, English).
15. Les disciplines d'enseignement général dans les programmes de l'enseignement technique et professionnel - France (1985, French).
16. Organization of Centralized Workshops - USSR (1985, English).
17. The Content of General Education in Technical and Vocational Education Programmes in the United Kingdom (1985, English).
18. Mobile Units for Vocational Education - USSR (1985, English).
19. Design and Use of Mobile Units for Technical and Vocational Education - Denmark (1985, English).
20. Technical and Vocational Education in the Arab Gulf Countries (1985, Arabic).
21. Content of General Education in Programmes of Technical and Vocational Education - Finland (1985, English).
22. Innovations in Technical Teachers' Training - Ukrainian SSR (1985, English).
23. Training Apprentices in Industrial Training Workshops - German Democratic Republic (1985, English).
24. Innovations in Teacher Training in the Field of Agriculture - Federal Republic of Germany (1985, English).
25. The Application of Computing in the Teaching and Learning Process in Technical and Vocational Education in Australia (1985, English).
26. Content of General Education in Programmes of Agricultural Technical and Vocational Institutions - Ukrainian SSR (1987, English).